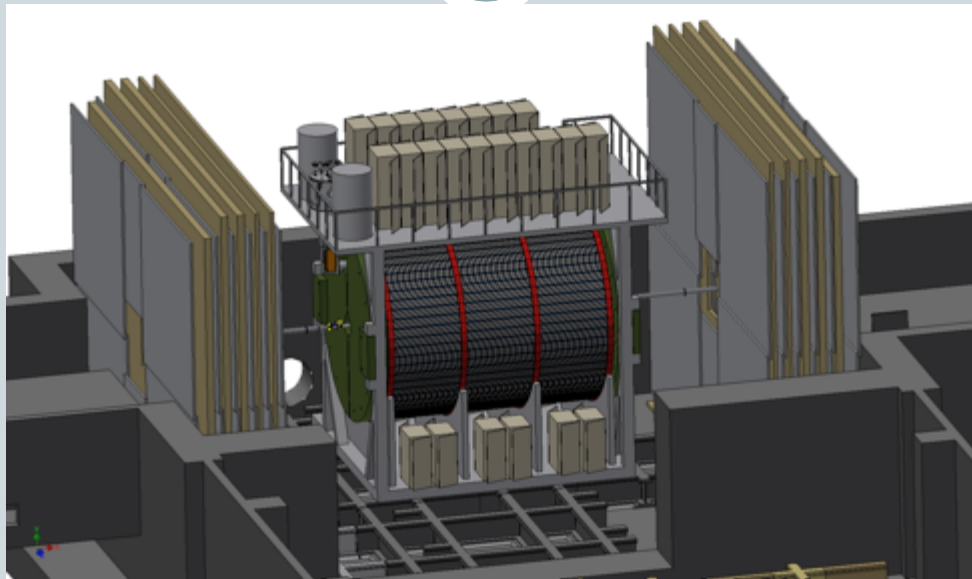


sPHENIX

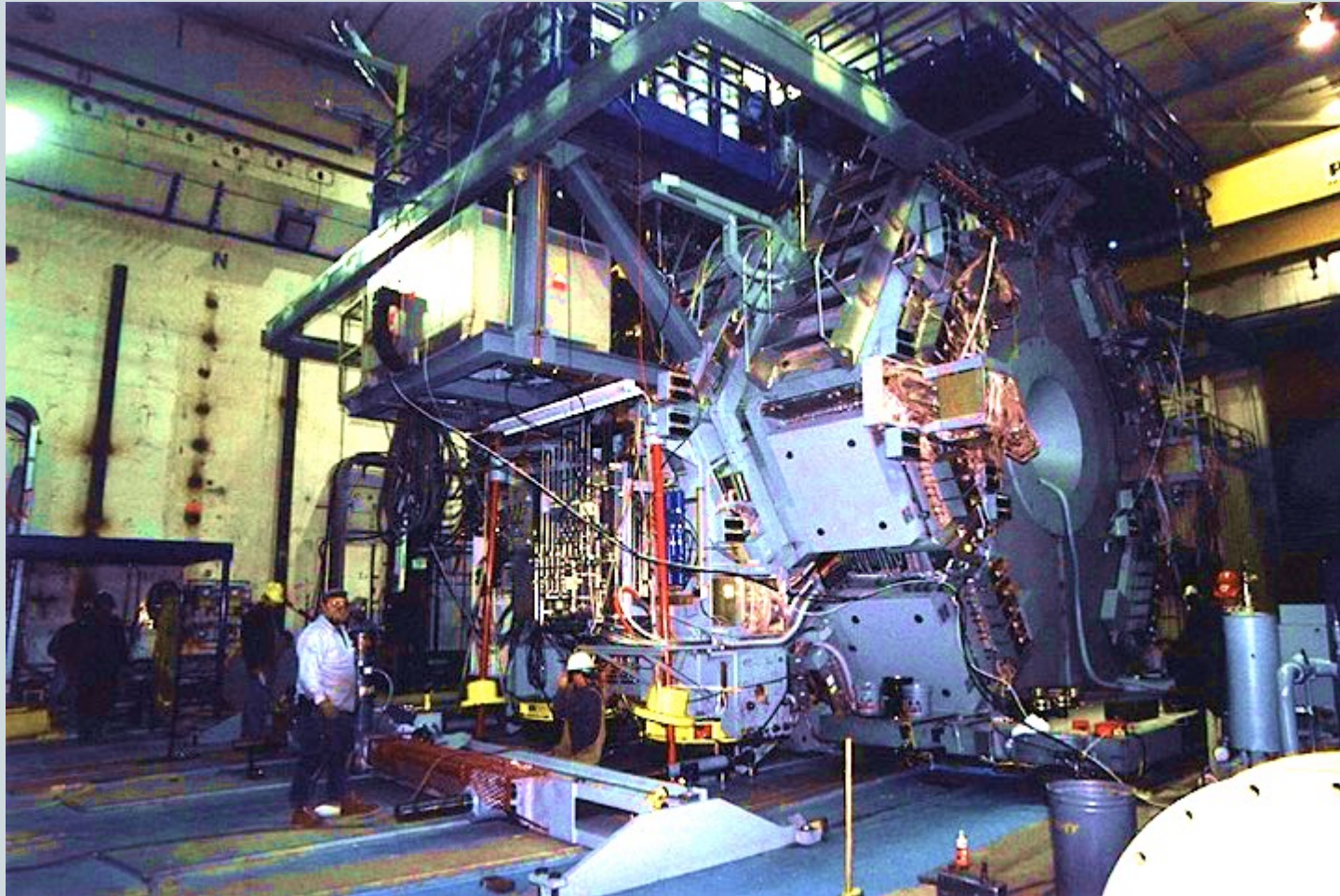
Magnet Assembly and Installation at 1008



DON LYNCH
DECEMBER 16, 2014

BABAR Experiment at SLAC

2



December 16, 2014

BABAR Magnet

3



sPHENIX Superconducting Solenoid Magnet Design Specifications

4

The sPHENIX superconducting solenoid magnet was formerly the BABAR magnet. It has the following characteristics:

Field Parameters:

Central Field 1.5 T Max.
Stored Energy 27 MJ

Main Coil Parameters

Mean Diameter of Current Sheet 3060 mm
Current Sheet Length 3513 mm
Number of layers 2
Operating Current 4596 A
Conductor Current Density 1.2 kA/ mm²
Inductance 2.57 H

Cryostat Parameters

Inner Diameter 2840 mm
Radial Thickness 350 mm
Total Length 3850 mm
Total Material (Al) ~ 126 mm

Outer HCal Steel

ID/OD 1780/2595 mm
Length 6010 mm
Weight 320 plates @ 1.44 metric Tons ea = 461 metric tons

Doors (each)

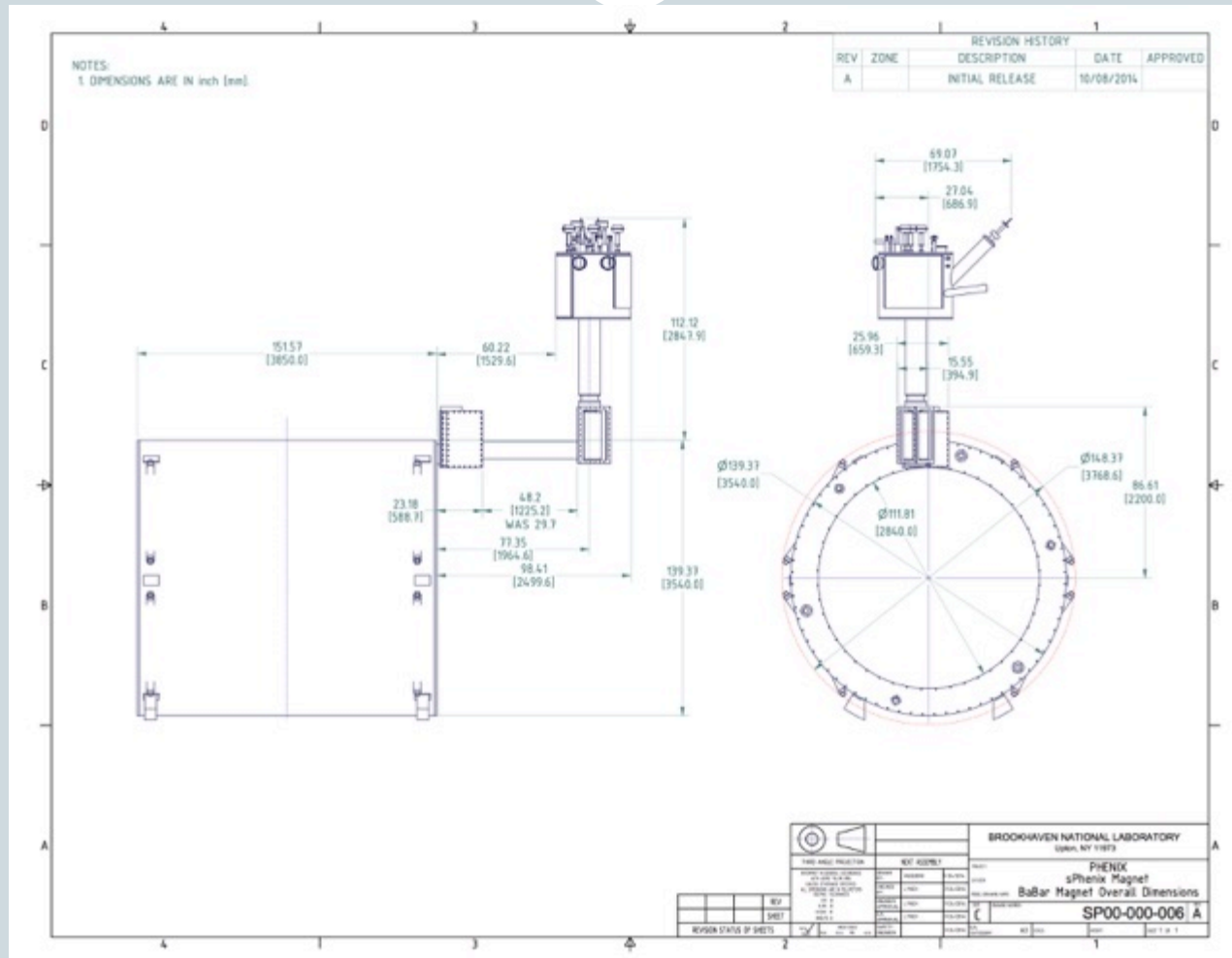
ID/OD 562/5190 mm
Thickness 30 mm
Weight 50 metric tons



December 16, 2014

Magnet Envelope Dimensions

5

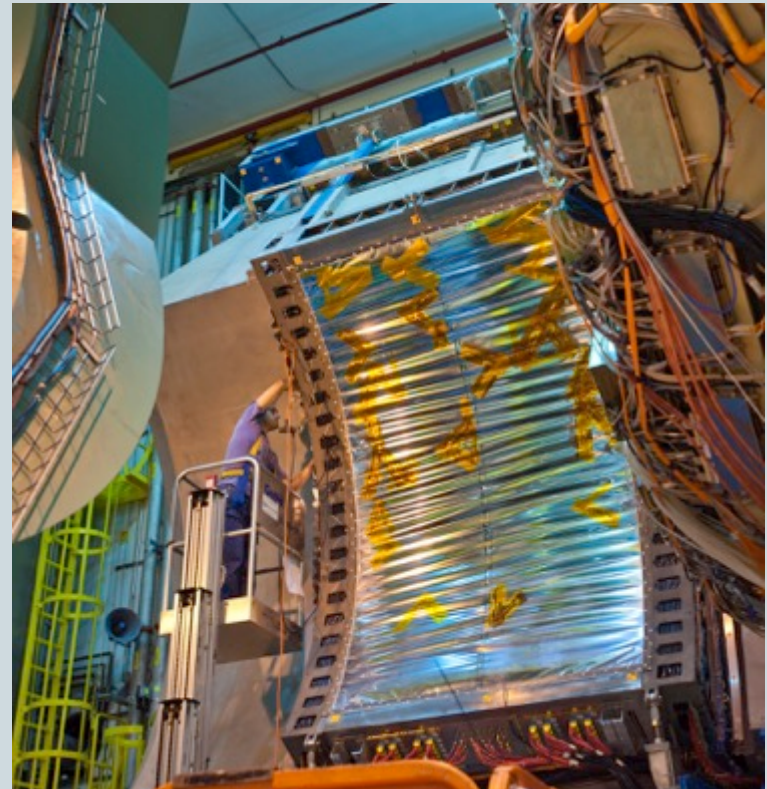


December 16, 2014

sPHENIX Assembly Plan

6

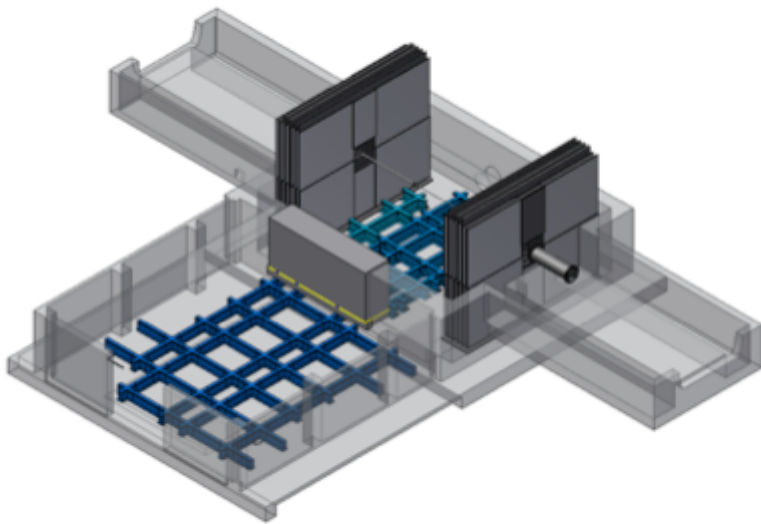
After completion of run 16, the existing PHENIX detector will be decommissioned and all major components will be disassembled and disposed of per the s PHENIX decommissioning plan. This is expected to be completed by September 2017.



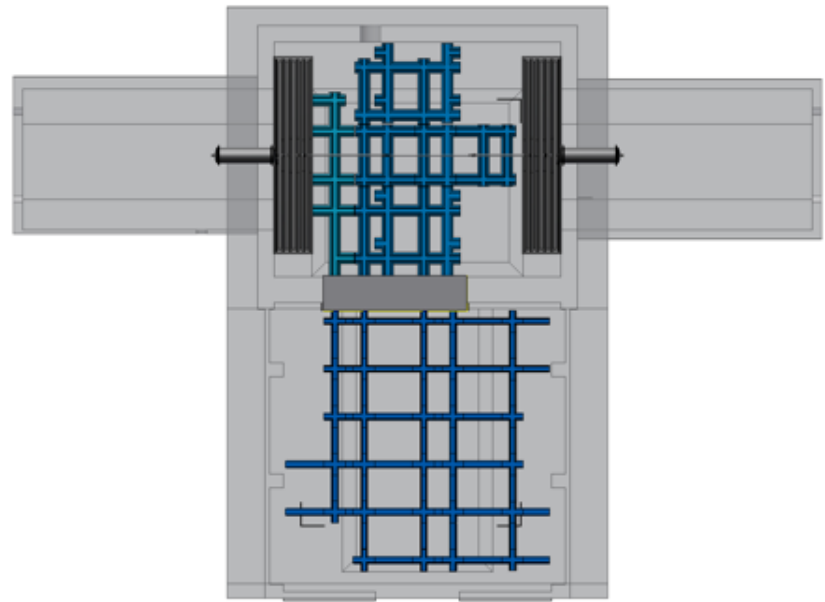
December 16, 2014

sPHENIX Assembly Plan (cont'd)

7



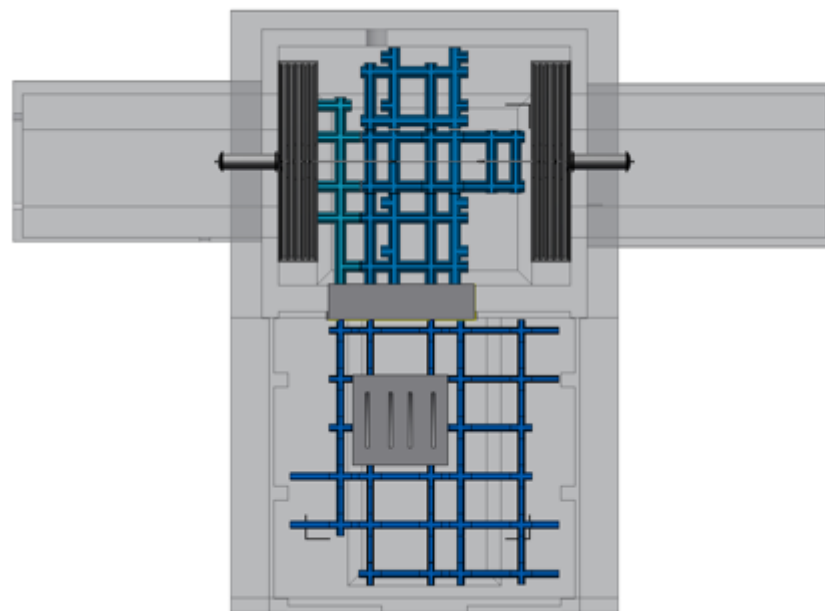
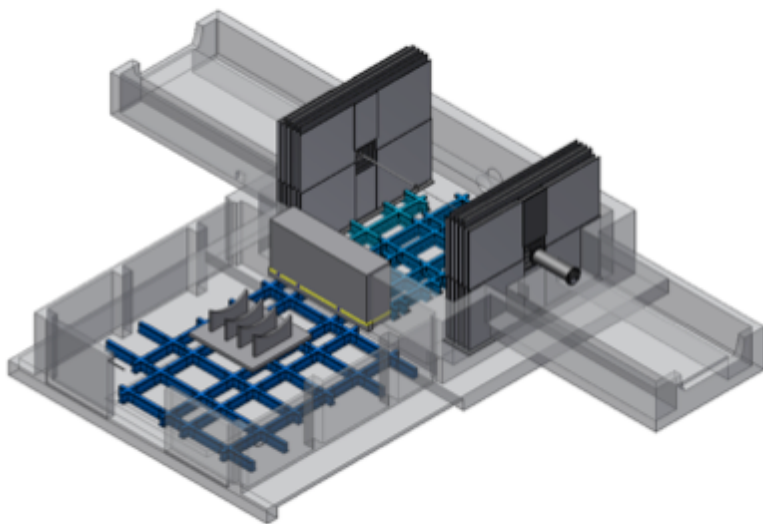
- After Decommissioning of PHENIX, Cryogenic and electric infrastructure support for magnet and detectors can begin. 9/11/17
- BES II, run 1
- After run shield wall disassembled but base remains in AH so that Assembly of detector base and magnet assembly can be worked on in AH 6/1/18



sPHENIX Assembly Plan (cont'd)

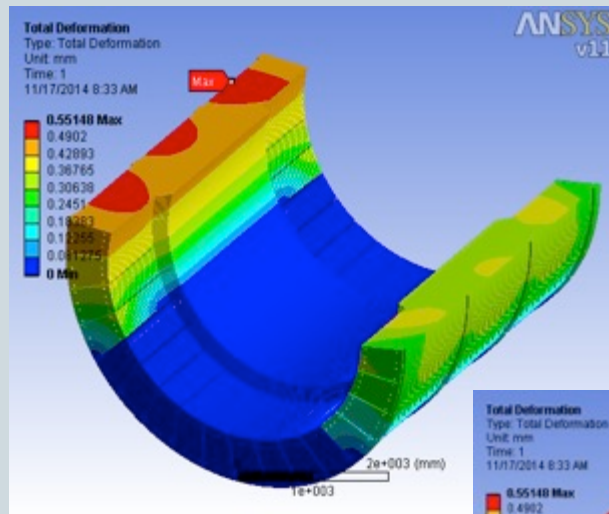
8

- Central Pedestal (CP) base and HCal support assembled at 1008 AH. Starting 9/1/17

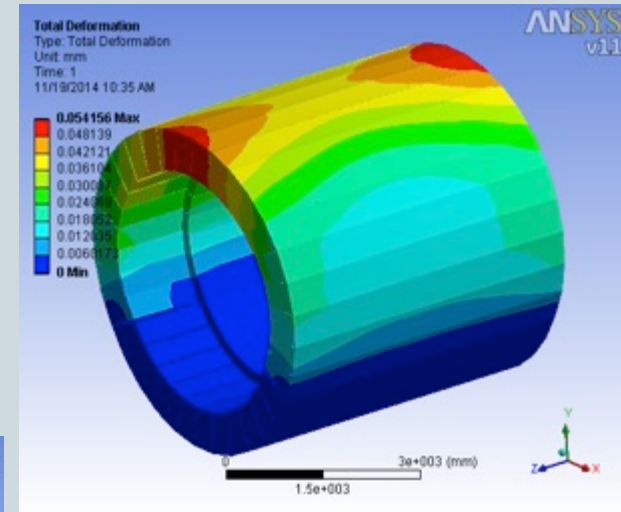
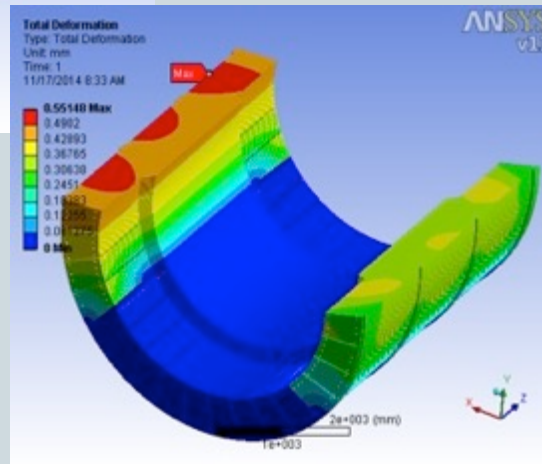


Outer HCal Cradle Support Analyses

9



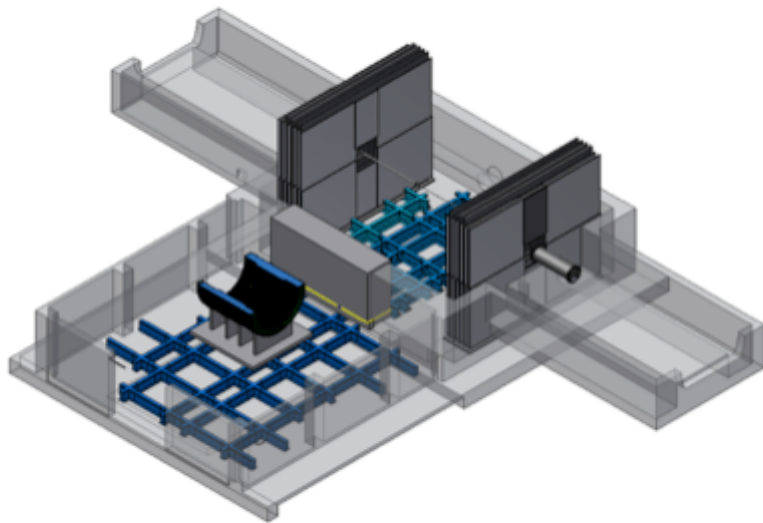
Anatoli Gordedevev currently analyzing stresses and deformations due to various design options for the cradle support of the Outer HCal and internal temporary support required to maintain circularity



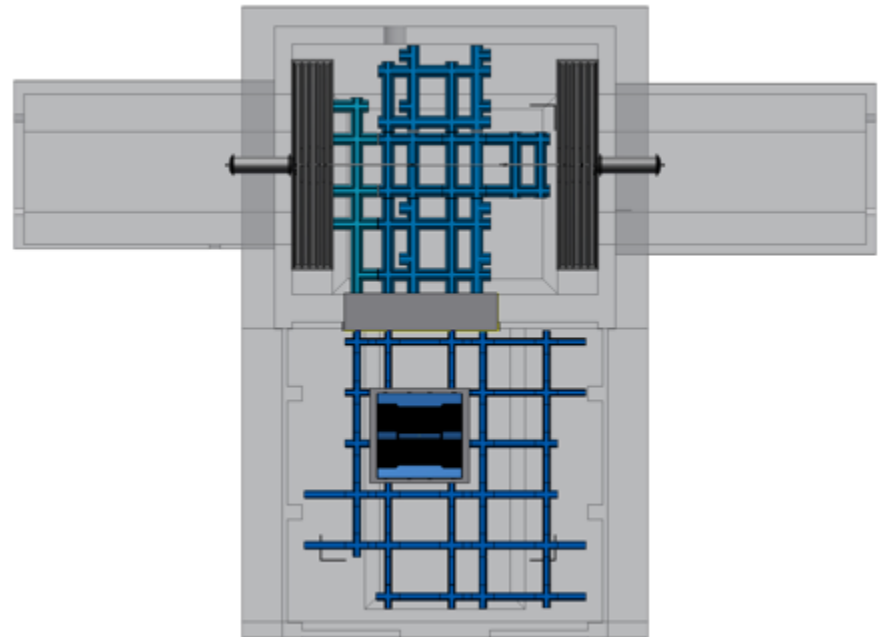
Support structure for magnet stack extension has not yet been designed. Conceptually, temporary support will be provided for partial detector magnet test, and support will be integrated into upper rack service platform for permanent installation.

sPHENIX Assembly Plan (cont'd)

10



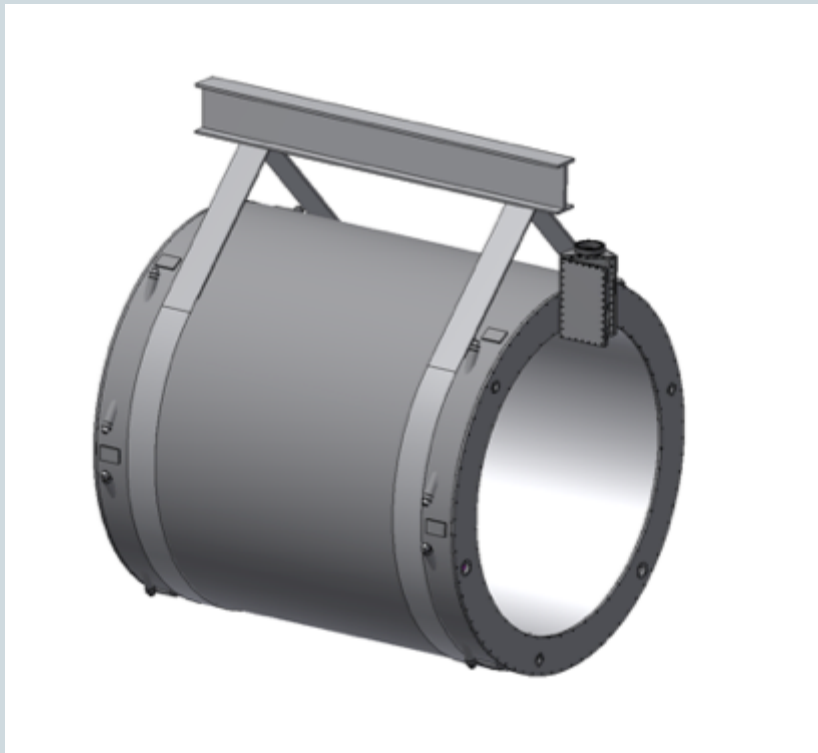
- 120 degree of Outer HCal transported to 1008 AH (first Outer HCal Module ready for installation 12/2/19)



Lifting the Magnet

11

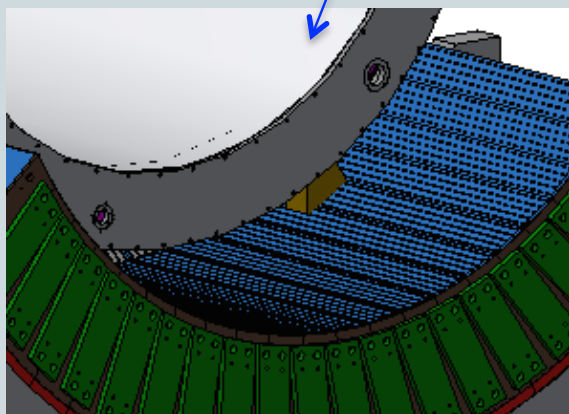
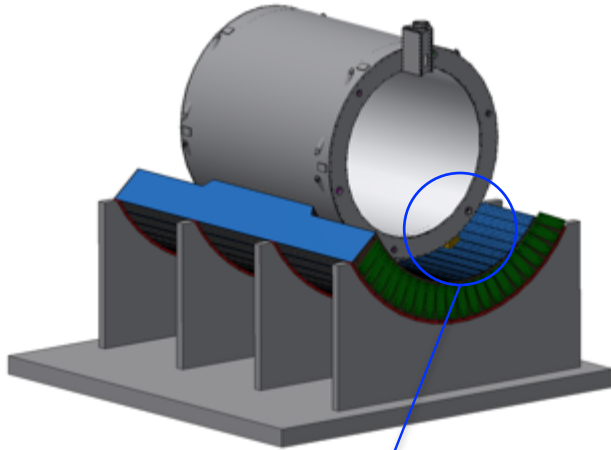
The magnet will be lifted with *same slings and spreader bar as in 912* after receipt from SLAC, except shipping frame is removed.



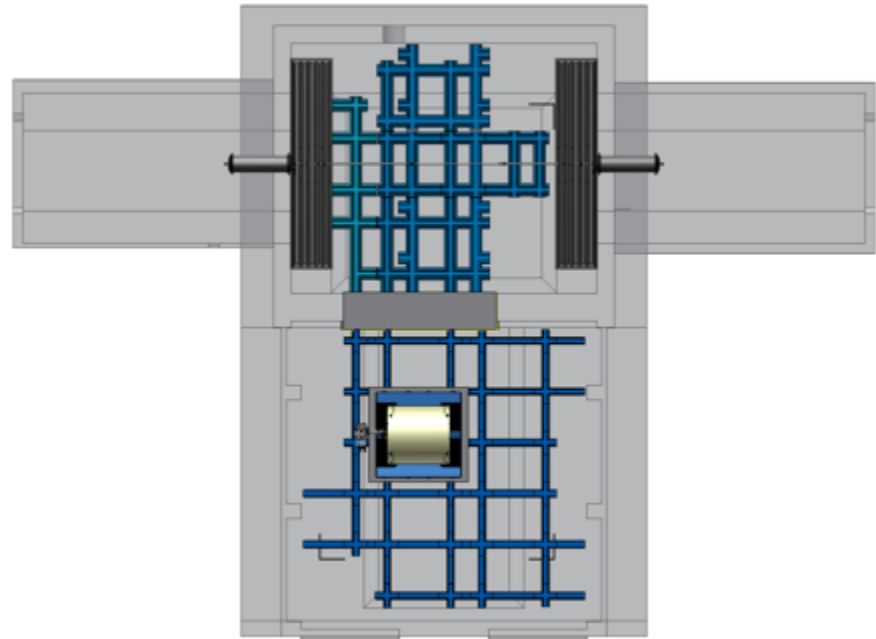
- Magnet will be transported to 1008 from 912 on BNL air-ride truck, backed through the PHENIX roll-up door (18' wide x 21.5 feet high), Picked by 40 ton crane using slings and spreader bar and placed on Outer HCal mounting pads.

sPHENIX Assembly Plan (cont'd)

12

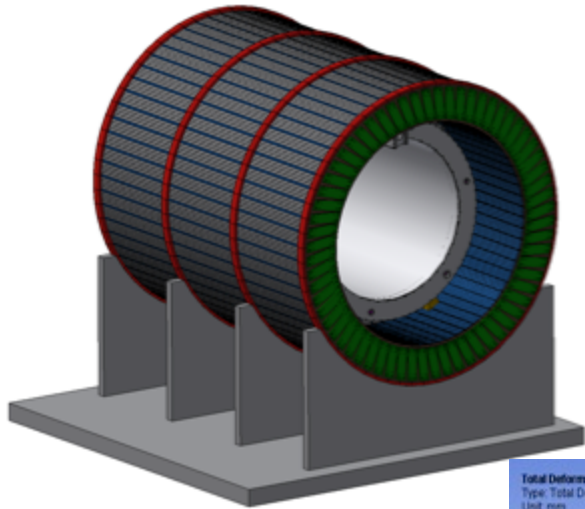


- Design of Magnet mounting pads and alignment plan is in development. Alignment specification of magnet to Outer HCal/nominal beam orbit is being determined.

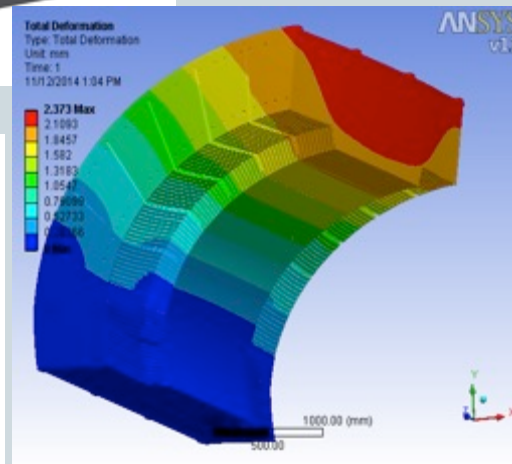
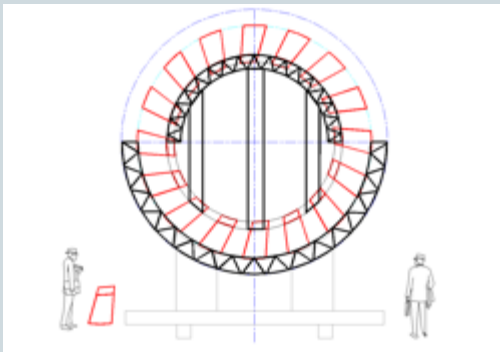


Assemble Full Outer HCal

13



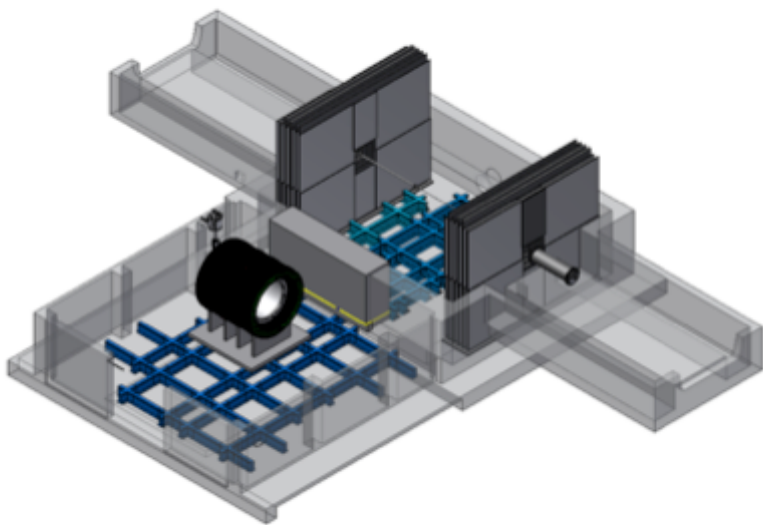
- Remainder of Outer HCal transported to 1008 and assembled around magnet. (Last HCal module ready for installation 1/24/20)
- Note: during HCal assembly temporary internal support (to be designed) will be utilized to assure that magnet does not structurally support HCal during assembly. Each HCal module weighs about 7-8 tons and will be lifted into place using the AH 40 ton crane.
- After assembly Outer HCal is self supporting and temporary internal supports are removed.



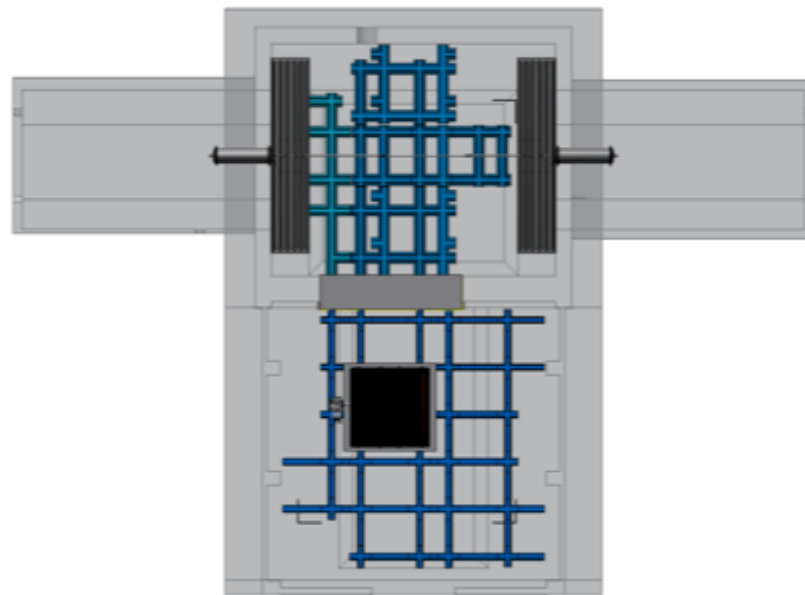
December 16, 2014

sPHENIX Assembly Plan (cont'd)

14

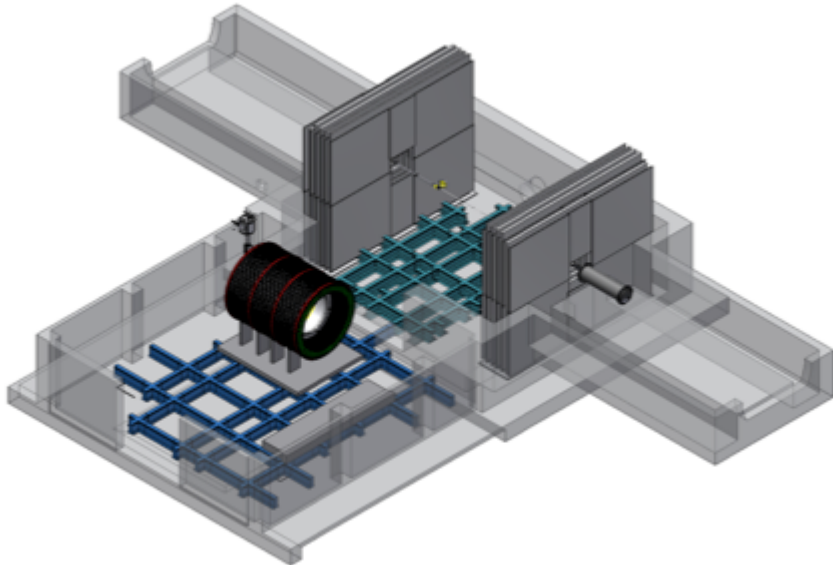


- Align the magnet to the outer HCal

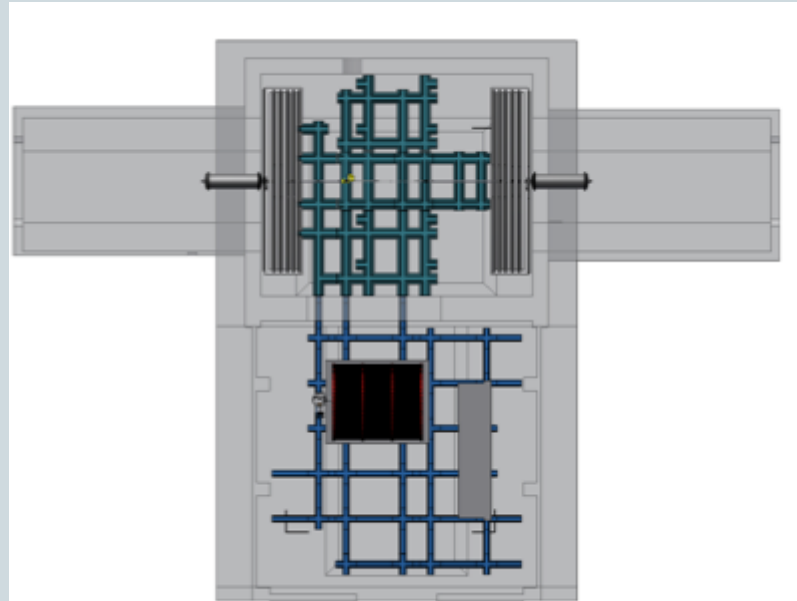


sPHENIX Assembly Plan (cont'd)

15

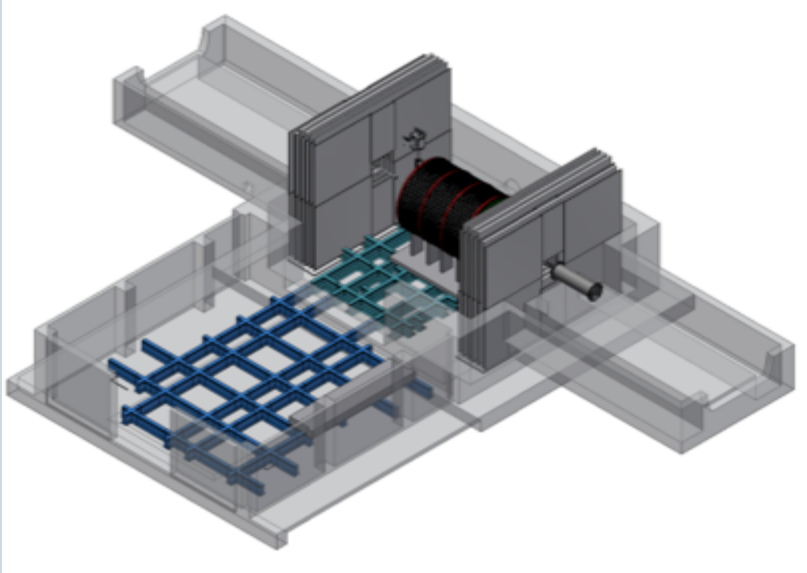


- Move shield wall base to side of AH



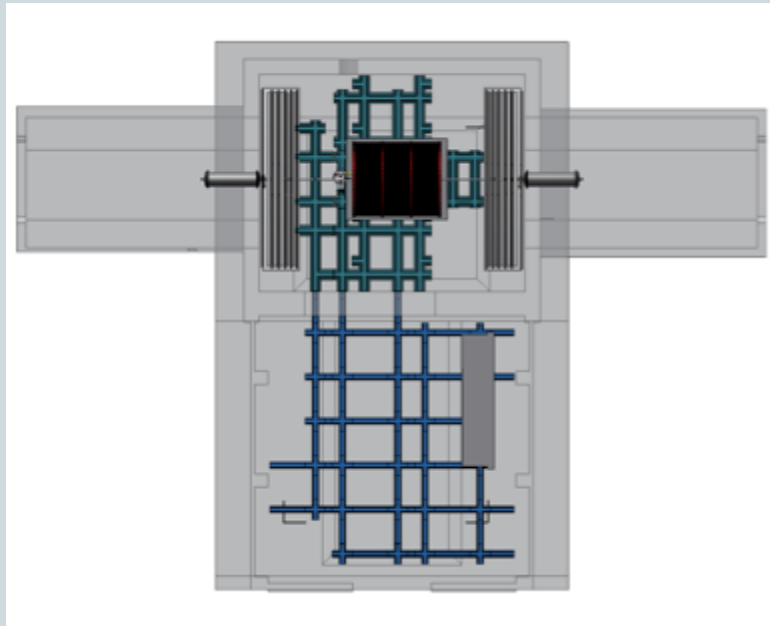
sPHENIX Assembly Plan (cont'd)

16



- Move Magnet & Outer HCal Assembly to IR for magnet testing and mapping

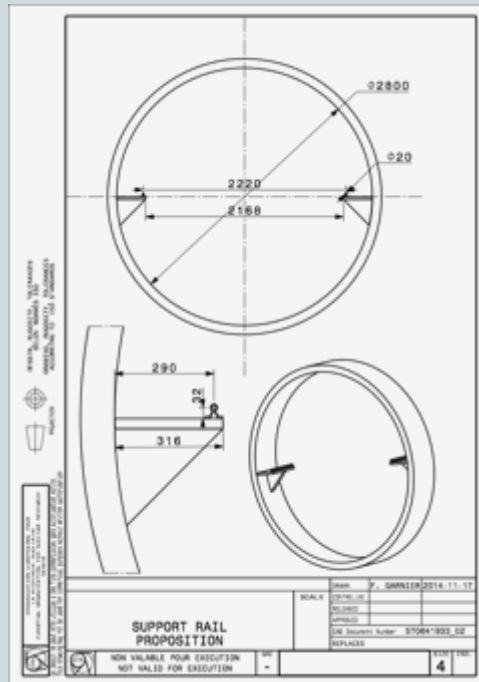
(shown without end caps)



Magnet Mapping

17

Magnet mapping using the existing CERN mapper that was used for STAR and recently ATLAS

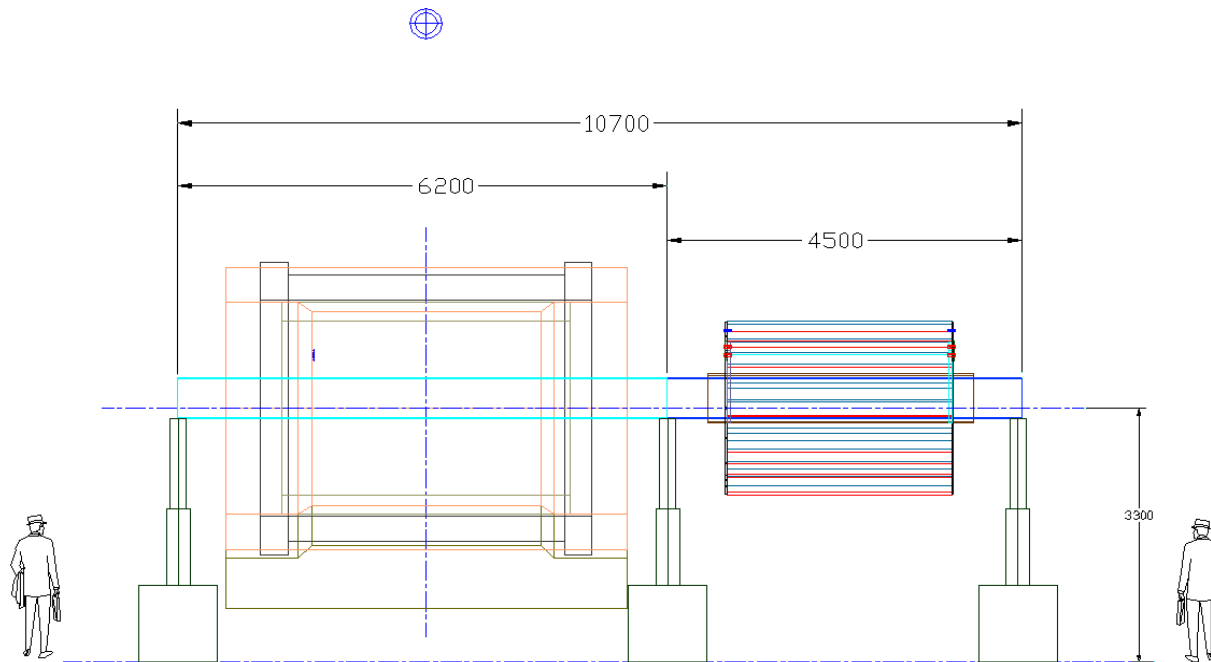


suggested supports



sPHENIX INNER HCal ASSEMBLY AND INSTALLATION

18



Inner HCal is assembled outside of Magnet and inserted into magnet on a temporary beam support.

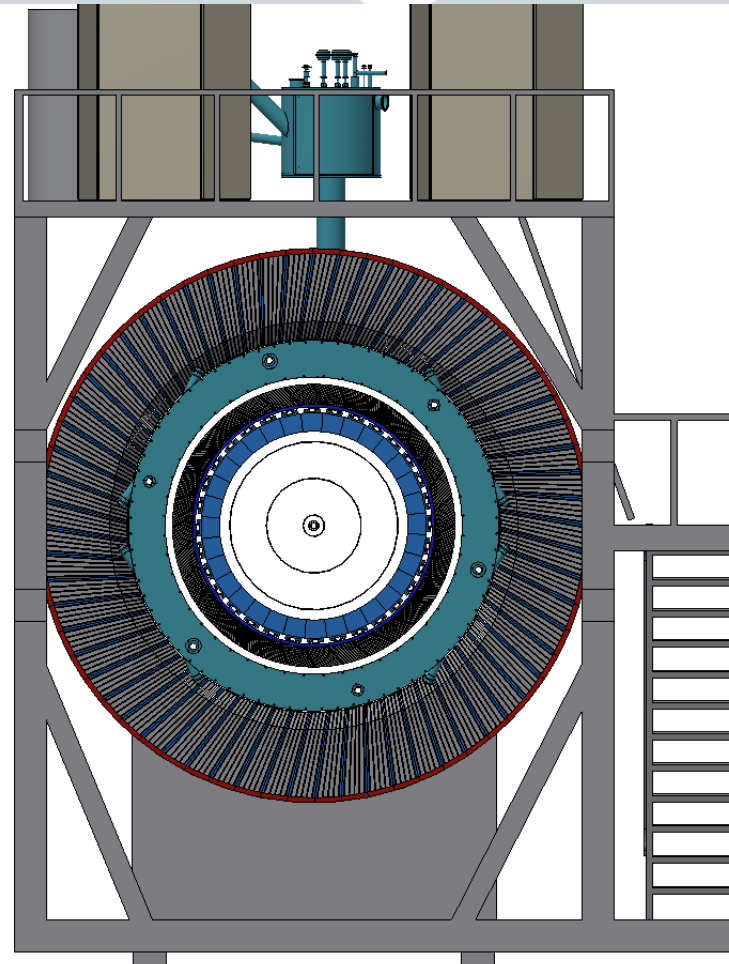
Permanent supports are then installed to transfer the load to the outer HCal. EMCal modules are inserted into the magnet on support rails attached to the Inner HCal.

Tracker is installed on rails attached to Inner HCal supports

Cryostat does not support any of the inner detector loading.

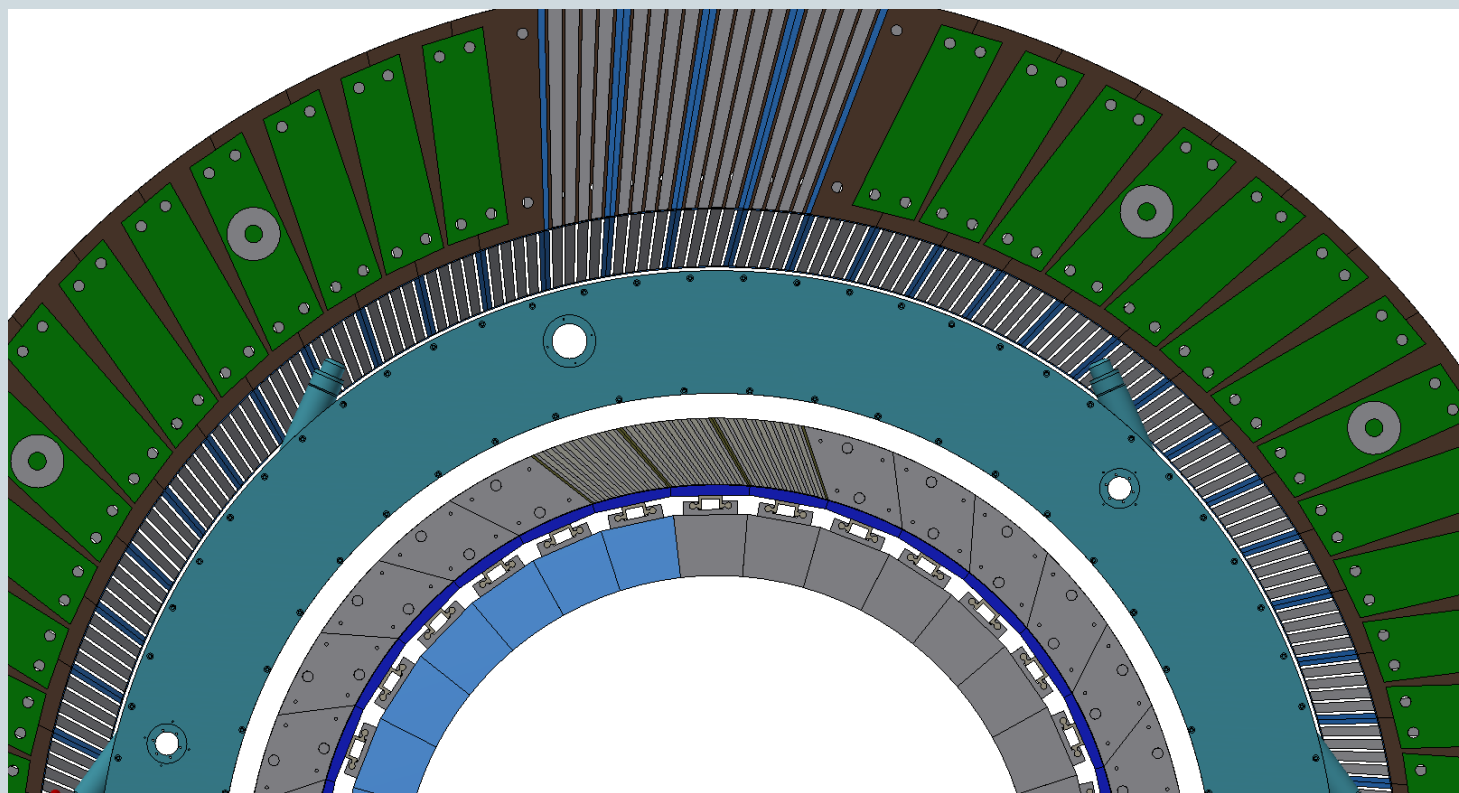
Load Transfer Outer HCal to Base

19



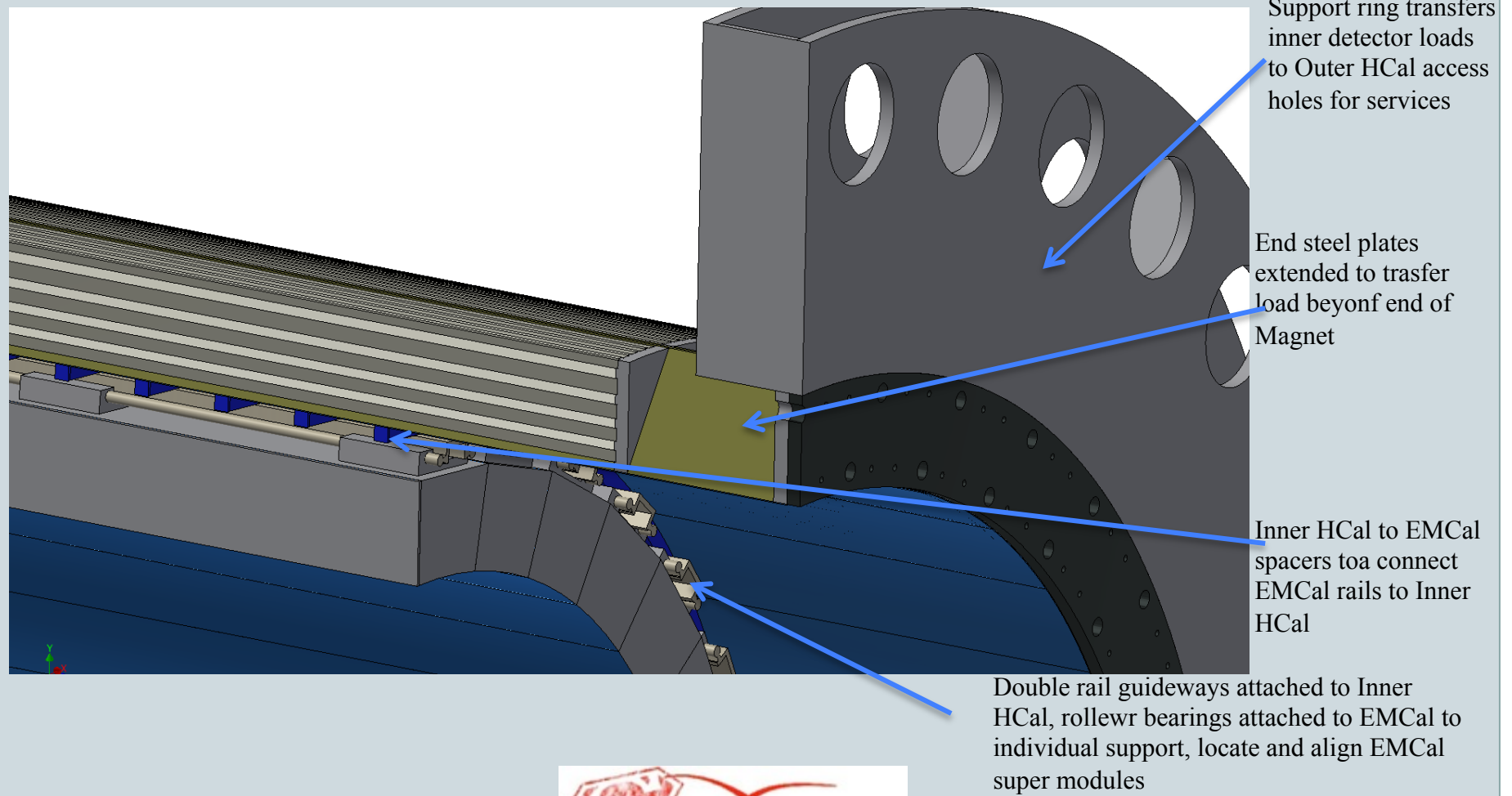
Cross-section Showing Outer HCal, Cryostat Inner HCal and EMCal

20



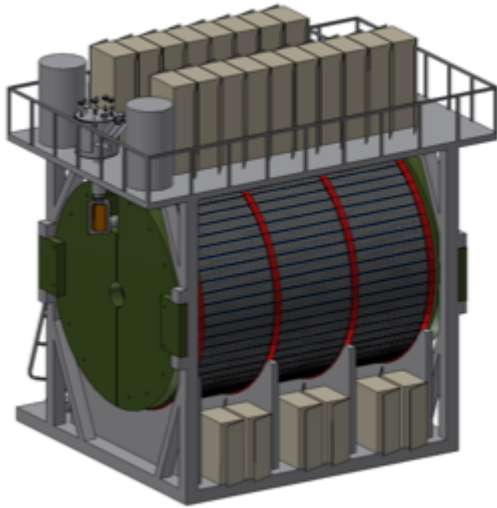
Inner HCal Load Transfer to Outer HCal

21

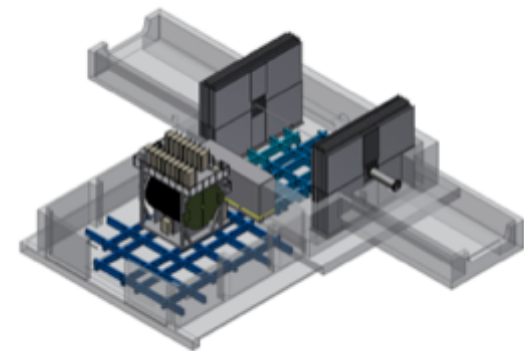
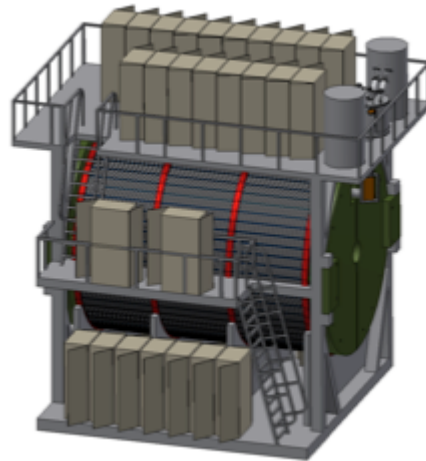


sPHENIX Assembly Plan (cont'd)

22

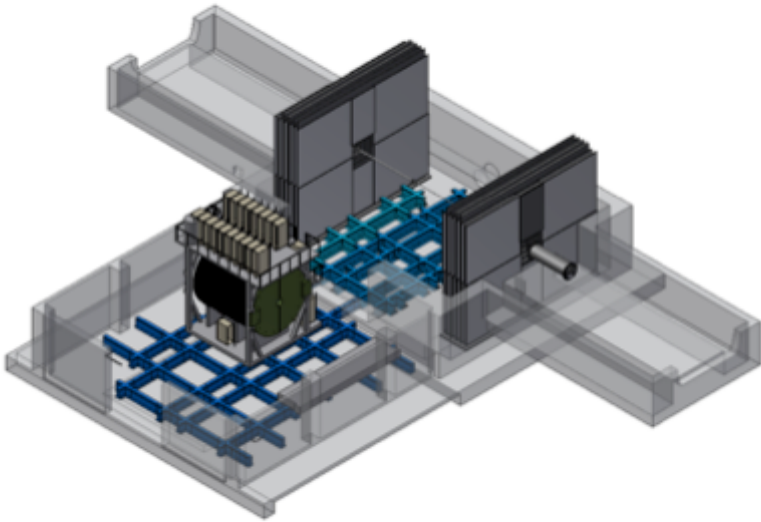


- Inner HCal, EMCal and Tracking detector subsystems installed
- All racks, cables and infrastructure services installed on CP
- Tracking modules installed inside Magnet
- Tracking module racks, cables and infrastructure services installed on CP
- End Cap flux returns installed.

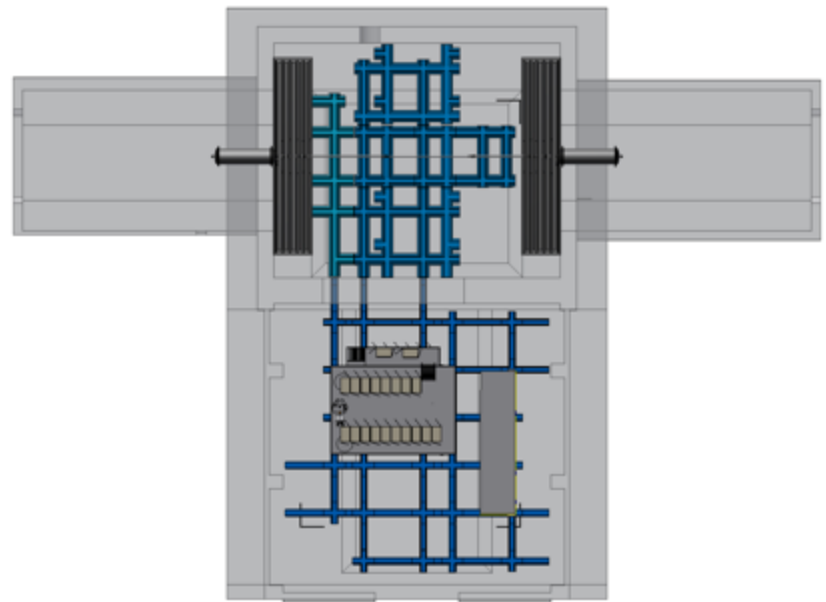


sPHENIX Assembly Plan (cont'd)

23

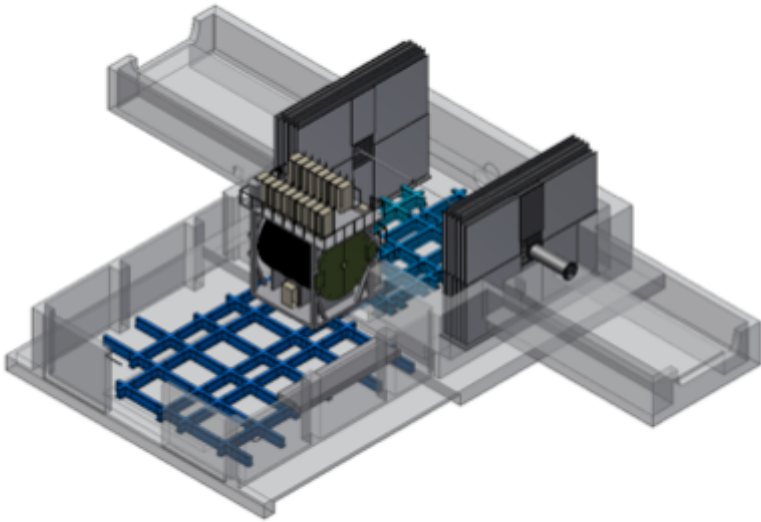


- Move shield wall base to side of AH

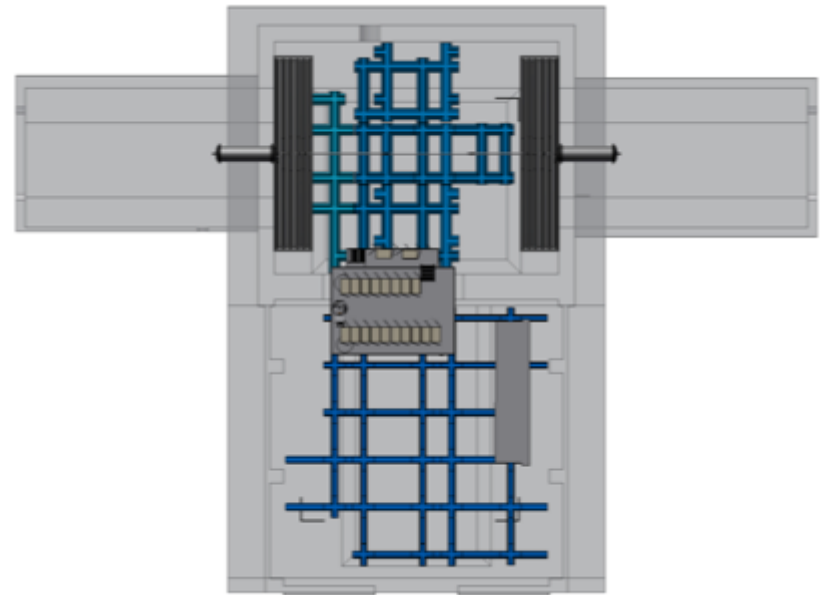


sPHENIX Assembly Plan (cont'd)

24

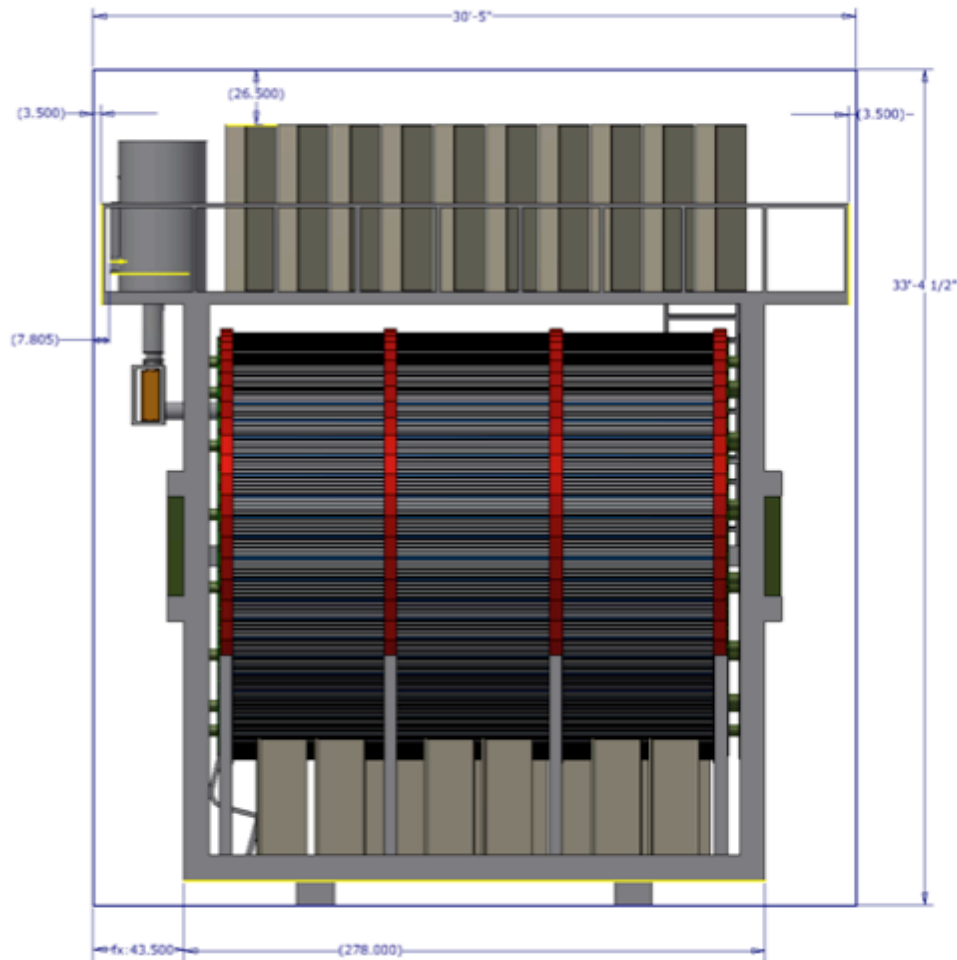


NOTE: Full assembly fits through shield wall opening



sPHENIX Assembly Shown in Shield Wall Opening

25

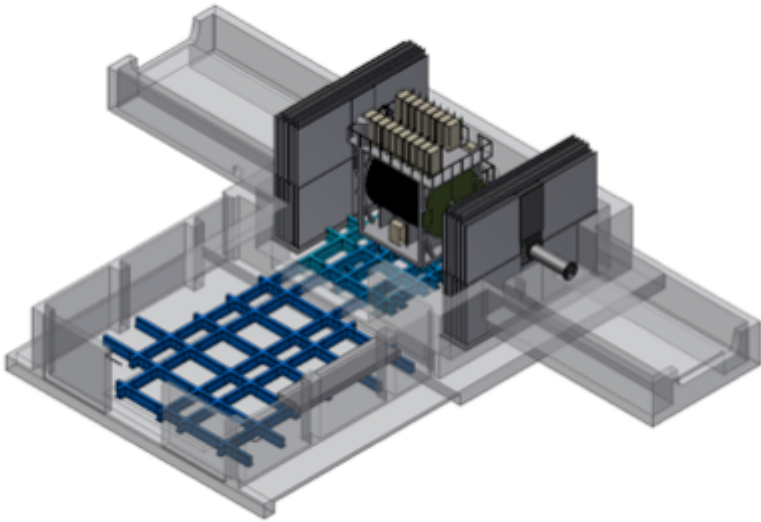


If Full Field Test with Outer HCal only or Outer HCal and caps Only:

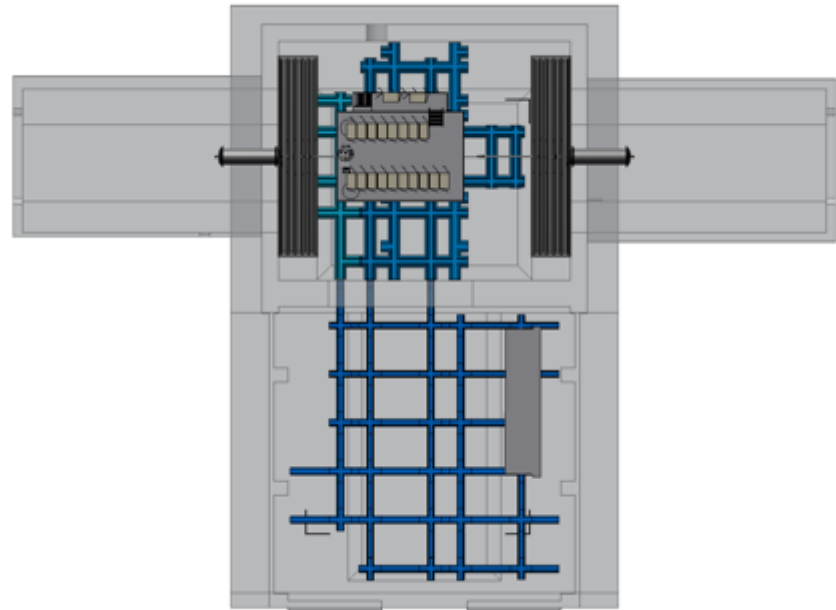
- At this point, can move Outer HCal and Magnet to IR for Full field test and field mapping.
- Then we move Outer HCal and Magnet back to AH to complete installation of remaining detector subsystems.

sPHENIX Assembly Plan (cont'd)

26

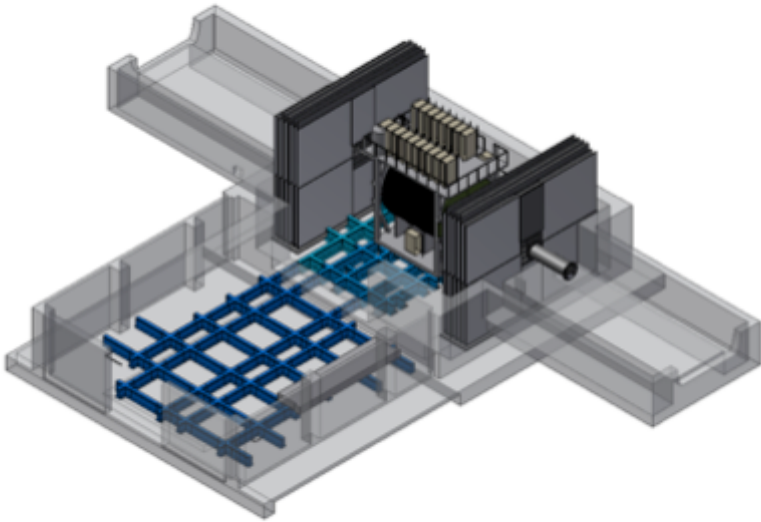


28. Entire detector moved to IR

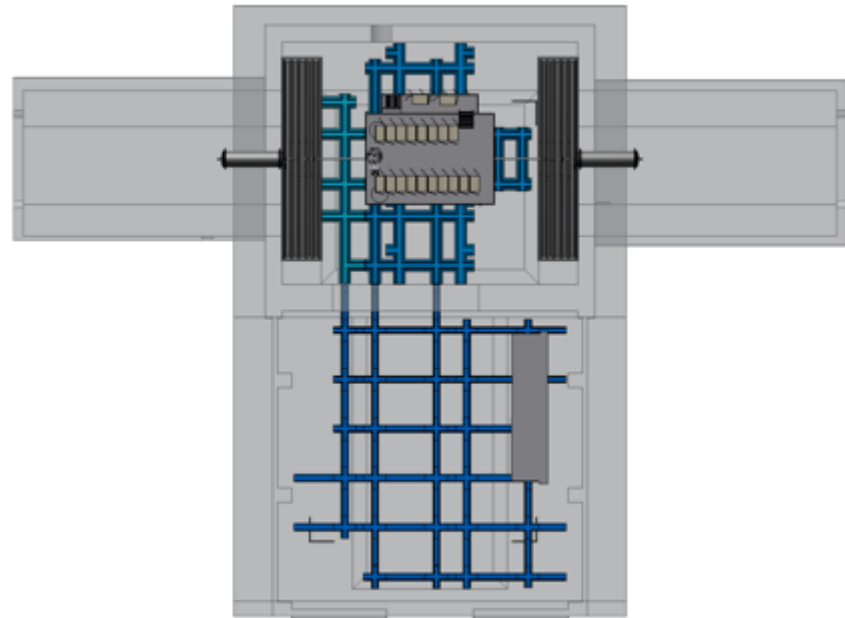


sPHENIX Assembly Plan (cont'd)

27

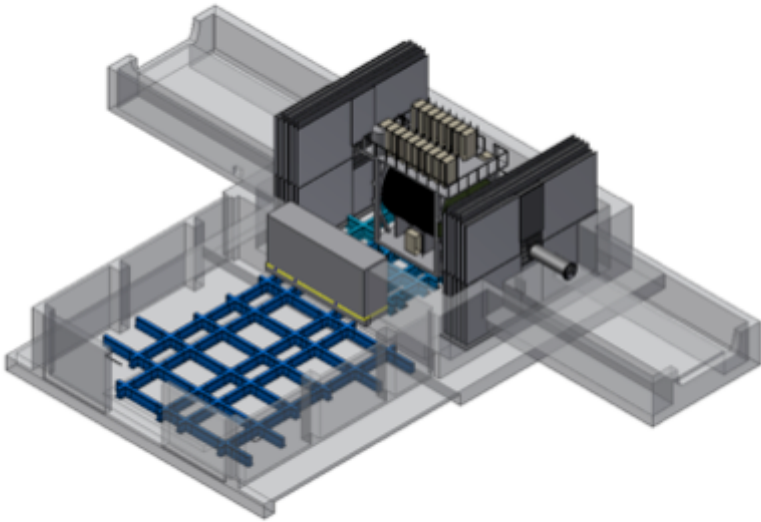


- Move entire assembly north to center on IP. Install Cryo, Electrical and all other services

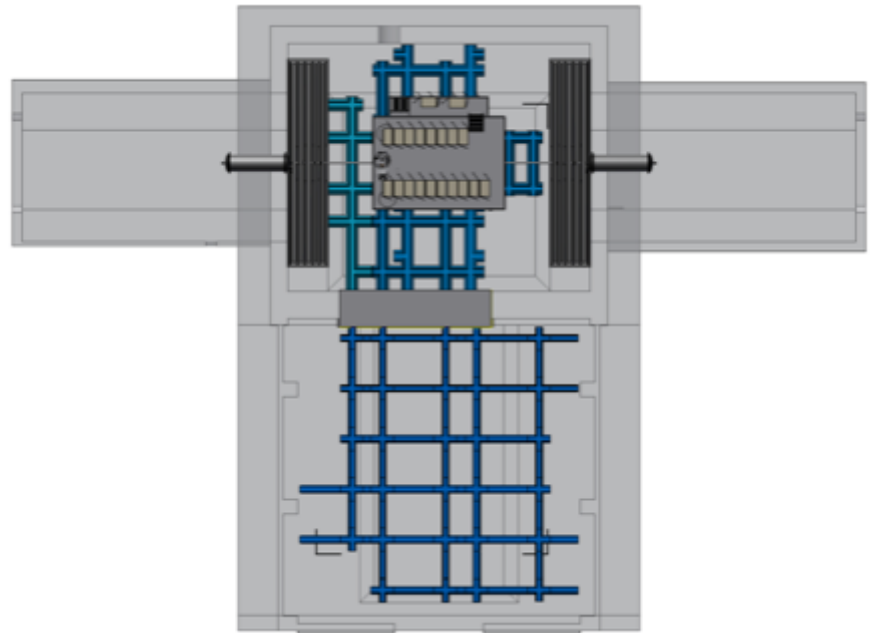


sPHENIX Assembly Plan (cont'd)

28



- Shield wall, rebuilt, commissioning and full field magnet test (re-test) in full run configuration



Backup Slides

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